



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

From Poachers to Protectors: Engaging Local Communities in Solutions to Illegal Wildlife Trade

Citation for published version:

Cooney, R, Roe, D, Dublin, H, Phelps, J, Wilkie, D, Keane, A, Travers, H, Skinner, D, Challender, DWS, Allan, JR & Biggs, D 2016, 'From Poachers to Protectors: Engaging Local Communities in Solutions to Illegal Wildlife Trade', *Conservation Letters*. <https://doi.org/10.1111/conl.12294>

Digital Object Identifier (DOI):

[10.1111/conl.12294](https://doi.org/10.1111/conl.12294)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Publisher's PDF, also known as Version of record

Published In:

Conservation Letters

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Full Title: From poachers to protectors: engaging local communities in solutions to illegal wildlife trade

Abbreviated title: Engage communities against illegal wildlife trade (45 chrtrs max)

Author List: Rosie Cooney^{1,2*}, Dilys Roe^{1,3}, Holly Dublin^{1,4}, Jacob Phelps⁵, David Wilkie⁶, Aidan Keane⁷, Henry Travers^{1,8}, Diane Skinner^{1,9}, Daniel W. S. Challender^{1,10, 14}, James R. Allan^{11,12}, and Duan Biggs^{1,11,13}.

Affiliations:

¹IUCN CEESP/SSC Sustainable Use and Livelihoods Specialist Group, c/o IUCN, Rue Mauverney 28, Gland, Switzerland.

²Interdisciplinary Environmental Studies, University of New South Wales, Kensington, NSW, 2052, Australia.

³International Institute for Environment and Development, 80-86 Gray's Inn Rd, London WC1X 8NH, United Kingdom.

⁴IUCN SSC African Elephant Specialist Group, c/o IUCN Eastern and Southern Africa Regional Office, P.O. Box 68200, Nairobi, Kenya 00200.

⁵Lancaster Environment Center, Lancaster University, Library Ave., Lancaster LA1 4YQ, UK.

⁶Wildlife Conservation Society, 2300 Southern Boulevard, Bronx NY 10460, USA.

1

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/conl.12294](#).

This article is protected by copyright. All rights reserved.

⁷School of Geosciences, University of Edinburgh, Crew Building, The King's Buildings, Alexander Crum Brown Road, Edinburgh EH93FF.

⁸Interdisciplinary Centre for Conservation Science, University of Oxford, Department of Zoology, Tinbergen Building, South Parks Road, Oxford, OX1 3P, UK.

⁹Independent consultant, PO Box MP113 Mt Pleasant, Harare, Zimbabwe.

¹⁰IUCN Global Species Programme, The David Attenborough Building, Pembroke Street, Cambridge, CB2 3QZ, UK.

¹¹ARC Centre of Excellence for Environmental Decisions, Centre for Biodiversity & Conservation Science, University of Queensland, Brisbane, Queensland 4072, Australia.

¹²School of Geography, Planning and Environmental Management, University of Queensland, St Lucia QLD 4072, Australia.

¹³Department of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa.

¹⁴Durrell Institute of Conservation and Ecology (DICE), School of Anthropology and Conservation, University of Kent, Canterbury, Kent, CT2 7NR, UK

*Correspondence to: rosie.cooney@iucn.org, 17 Sunnyside Ave, Wentworth Falls, NSW 2782 Australia

Abstract: 159 words

Manuscript: 3,008

Tables: 0

Figures: 2

References: 30

Keywords: (up to 10) livelihoods, illegal wildlife trade, community-based conservation, poaching, enforcement, sustainable use, incentive-driven conservation

Abstract:

Combating the surge of illegal wildlife trade (IWT) devastating wildlife populations is an urgent global priority for conservation. There are increasing policy commitments to take action at the local community level as part of effective responses. However, there is scarce evidence that in practice such interventions are being pursued and there is scant understanding regarding *how* they can help. Here we set out a conceptual framework to guide efforts to effectively combat IWT through actions at community level. This framework is based on articulating the net costs and benefits involved in supporting conservation *vs* supporting IWT, and how these incentives are shaped by anti-IWT interventions. Using this framework highlights the limitations of an exclusive focus on "top-down", enforcement-led responses to IWT. These responses can distract from a range of other approaches that shift

This article is protected by copyright. All rights reserved.

incentives for local people toward supporting conservation rather than IWT, as well as in some cases actually decrease the net incentives in favour of wildlife conservation.

Main Text:

Introduction:

The illegal wildlife trade crisis

Illegal wildlife trade (IWT) in wild species and products – ranging from rhino horn and elephant ivory, to medicinal plants, timber, shark fins and pangolins – is an urgent global conservation challenge that has escalated dramatically in the last decade (Challender and MacMillan 2014; Wittemyer et al. 2014).

Since 2012, this crisis has attracted in excess of US\$350 million in donor and government funding (Duffy and Humphreys 2014), and prompted high-level intergovernmental policy initiatives including the London (2014) and Kasane (2015) Conferences on IWT, the African Union's International Conference on Illegal Exploitation and Illicit Trade in Wild Flora and Fauna in Africa (Brazzaville; 2015), a UN General Assembly Resolution (2015), and relevant commitments in the Sustainable Development Goals (2015). In terms of addressing poaching in source countries (as distinct from demand in consumer states) these policy commitments emphasise two broad areas: law enforcement, and measures focused on communities and sustainable livelihoods. However, to date the emphasis in most policy debates and in donor resource allocation has been on strengthening state- and private sector-led law enforcement to reduce IWT. This enforcement is increasingly militarised in response to increasingly militarised poaching and to linkages with terrorism and state security (Duffy 2014; Lunstrum 2014; Buscher & Ramutsindela 2016). Militarisation of the anti-poaching response involves the use of military and paramilitary personnel (including private military forces), training, and technologies (e.g. drones and high-powered weapons) (Lunstrum 2014), and at field level is

associated with increasingly punitive and lethal responses against suspected poachers (e.g. Makoye 2014; Konopo 2016).

By contrast, community-level interventions to reduce poaching for IWT have attracted far less attention and investment (IUCN SULi 2015). Details of how and where community-level interventions should be implemented and how they impact IWT remain vague, with designated resources and implementation largely lacking. Here we present a conceptual framework that highlights the incentives created by different types of policy interventions for local community actors to either poach or to protect wildlife. We use this framework to demonstrate the limitations to a “top-down” enforcement-only IWT strategy, including that such an approach can critically undermine approaches based on community empowerment, engagement, and benefit-sharing. We argue that diverse community-level approaches should and must be integrated into more effective anti-IWT responses.

Incentives shaping community attitudes and behavior in relation to IWT

Human decisions concerning conservation and exploitation of natural resources are shaped fundamentally by the incentives (financial and non-financial costs and benefits) accrued, as well as culture, norms, beliefs, values, lifestyles and cognitive factors (Milner-Gulland and Rowcliffe 2007; St John et al. 2015). How these factors combine to affect individual decision-making varies according to both context and individual preferences. Studies in specific contexts have highlighted diverse motivations for poaching within communities, including i) the requirement to meet subsistence needs, ii) the desire to improve financial well-being or social standing, iii) cultural practices and traditions, iv) other non-instrumental motivations such as the desire to retaliate for direct losses due to wildlife or for current or historical perceived injustices (Duffy 2010; Harrison et al. 2015). Community-based conservation (CBC) programmes seek to achieve conservation outcomes - including reduced poaching - predominantly by either increasing the financial benefits individuals receive through conservation, increasing the opportunity cost of behaviours that are incompatible with conservation or by instilling normative compliance

through providing public goods (Gibson and Marks 1995). We build on and extend this thinking in the context of IWT to develop a conceptual framework for understanding individual decisions around poaching (Fig 1).

It is a reasonable assumption that for wildlife conservation to prevail, a necessary but not sufficient condition is that the expected net benefits (benefits minus costs) of wildlife conservation to community members with the means and opportunity of engaging in IWT must be greater than the net benefits (Fig. 1). We include in "conserving wildlife" any action with the effect of promoting or furthering conservation, from passive (e.g. tolerating presence of wildlife) to active (e.g. protecting wildlife from poaching). Likewise "engaging in IWT" includes any action supporting IWT, from passively concealing the identity of poachers to actively participating in illegal extraction, trafficking and/or trade. We recognise that the instrumental motivations included in this framework are only part of the motivation for individual decision-making. For example, colonial legacies including the loss of legitimate forms of access to natural resources may contribute to poaching as a form of protest (Duffy 2010). However, costs and benefits to community members also interact with and shape broader social values and norms around conservation and poaching, albeit in complex ways mediated by perceptions of legitimacy, local institutions and culture (Scanlon and Cull 2009).

A broad range of financial and non-financial social and economic benefits and costs are associated with both conserving wildlife and with engaging in IWT (Fig 1). Critically, however, these costs and benefits are not evenly distributed among individuals within a community. For instance, some benefits of conserving wildlife accrue to the individual, and vary widely according to factors such as gender, ethnicity and status (e.g. gaining conservation-related jobs); while others accrue at the community level and are more equitably

shared amongst community members (e.g. hunting lease payments to community land rights holders) (Naidoo et al. 2016). Likewise poachers can often be distinguished into varying types, with different social and economic linkages to local communities (Phelps and Webb 2015). This conceptual framework will yield different net incentives for different individuals, so needs to be applied with attention to the heterogeneity of costs and benefits amongst people in a local community, varying types of poachers, and the dynamic nature of payoffs to all actors over time.

To elaborate how this framework can apply to specific community members or poacher types is beyond the scope of this paper. Rather, we present here a simple conceptual model to help structure thinking about the basic conditions that will need to be in place for successful anti-IWT interventions. There are likely to be some circumstances where community-level interventions to help achieve the condition set out in Fig 1 are not applicable; for instance, where poaching takes place in remote areas far from settled communities and involving mobile gangs of poachers. However, this framework is likely to be relevant wherever the behaviours and decisions of local communities living with wildlife affect patterns of IWT, including effective provision of intelligence and cooperation in enforcement.

Applying this conceptual framework to interventions to combat IWT

We now consider each component of this framework, setting out how interventions to combat IWT can shape key incentives. We then discuss the importance of interaction between the payoffs, with specific reference to the impact of state-led enforcement approaches on overall incentives for IWT.

i. Increasing benefits from wildlife conservation

Some anti-IWT interventions seek to shift incentives by increasing the benefits realized by community members from conserving wildlife (Box 1 in Fig 1). This follows the well-established logic of common property resource governance theory (Ostrom 1990) and its application to wildlife in the form of Community-Based Natural Resource Management (CBNRM) (Hulme and Murphree 2001).

Increasing the benefits from conservation can be pursued through approaches such as strengthening community ownership rights and/or capacity to use, manage and benefit from wildlife (either for subsistence or commercial purposes), including pursuing traditional cultural practices linked to wildlife, participating in Payments for Ecosystem Services (PES) schemes, securing jobs as community guards or in nature-based tourism enterprises, or strengthening cooperation and communication with conservation/wildlife management agencies (IUCN SULi 2015 et al.; 2016; Roe 2015). Such benefits can be powerful in motivating communities to be active and committed conservation actors against poaching and IWT, as evidenced in conservancies in Namibia (Naidoo et al. 2016) and Kenya (Blackburn 2016). Effectiveness of different interventions will vary according to local context: for example, benefits from tourism are only feasible where certain conditions are met, such as political stability, tourism infrastructure and scenic landscapes (Naidoo et al. 2016).

CBC and CBNRM initiatives have failed when the generated benefits have been insufficient to offset individual costs, too diffuse to result in the creation of norms in favour of conservation or

captured by government/community elites (Gibson and Marks 1995, Child 1995). As such, increasing benefits from conservation is likely to be most effective in reducing IWT in those cases where the benefit flows to local communities are conditional on conservation outcomes, i.e. where better conservation outcomes are associated with increased or more secure benefits and vice versa; where benefits are experienced by a significant proportion of the community; *and* where accountability for these positive changes can be demonstrated clearly i.e. where changes in conservation status can be clearly attributed to actions of specific people or groups. This is the case with many sustainable use approaches, and some PES schemes (e.g. Lewis et al. 2011; Naidoo et al. 2016).

ii. Decreasing the costs of living with wildlife

Promoting conservation over IWT can also involve efforts to reduce costs associated with conserving wildlife (Box 2, see Fig 1.), including threats to personal security, livestock or crops; resource competition; and disease transmission between livestock and wildlife.

Communities are often substantially disadvantaged by these impacts, particularly where they pose risks to life or livelihoods, leading to anger, resentment and retaliatory poaching (Dickman 2010; Twinamatsiko et al. 2014). Interventions to reduce costs can include the construction of physical barriers such as fences to keep wildlife away from crops and livestock, problem animal control; and insurance or compensation schemes for crops damaged by wildlife (Hoare 2012). Reducing these costs may assist (or indeed be necessary) in shifting overall incentives for local people away from IWT and in favor of conservation. However, alone these interventions are unlikely to be sufficient, particularly in the context of escalating prices for illicitly sourced wildlife products (Challender and MacMillan 2014).

iii. Reducing the benefits of engaging in IWT

A third type of anti-IWT intervention at community level aims to reduce the benefits that people can gain through engaging in IWT (Box 3 in Fig 1), through means such as reducing offtake of wildlife through increasing detection of snares (Linkie et al. 2015) or "devaluing" wildlife items e.g. infusing rhino horns with chemicals (Ferreira et al. 2014). While such interventions may likewise be important in shifting overall payoffs away from IWT, in most cases they will need to be augmented with other approaches to effectively reduce it.

iv. Increasing costs of engaging in IWT

The most widely emphasised response to IWT focuses on increasing the costs associated with engaging in it (Box 4 in Fig 1). This is typically through state-led (sometimes private) law enforcement (Roe et al. 2015a), which can involve tightening restrictions on harvest and trade; increasing the probability of detection and capture; increasing the chances of successful prosecution; and/or increasing sanctions and penalties (Duffy 2014; St John et al. 2015).

The costs of engaging in IWT can also be increased through approaches that empower and engage communities as active and motivated partners in law enforcement (Lotter and Clark 2014; Naidoo et al. 2016; Roe 2015). In Mali, for example, the Mali Elephant Project has supported local communities to establish voluntary game patrols to monitor elephant populations and detect poaching incursions (Roe 2015). In many cases, local residents are best placed to know what is happening on the ground, including who is poaching and their movements - information typically scarce in the IWT context. They can apply social and informal

sanctions to members of their communities, and can be the "eyes and ears" of formal enforcement authorities as scouts, informants and guides that work cooperatively through joint patrols or information sharing (Lotter and Clark 2014; Wilkie, Painter and Jacob 2016). These approaches will be strongest where people feel a strong sense of ownership or stewardship over wildlife - where they are protecting "their" wildlife (Wilkie, Painter and Jacob 2015). Mechanisms can be established to enable people to easily, anonymously and safely report information, increasingly through mobile technologies. This is relevant wherever IWT takes place in or around areas where communities live, regardless of whether local residents are involved in IWT or not. Given the prevalence of IWT driven by "outsiders" and the increasingly militarised nature of some IWT, it is vital that community members are not endangered by such interventions and they will typically need strong and reliable backup from well-equipped authorities with the power of arrest. Ample evidence shows that law enforcement and crime prevention is most effective when citizens and armed authorities both contribute (Hawdon and Ryan 2011).

A further popular anti-IWT strategy is providing "alternative livelihoods" for local communities, understood here as those not based on (legal or illegal) use of wild resources (e.g. small-scale farming, retail enterprises). The most commonly cited rationale for these interventions is that by providing an alternative source of income they reduce dependence on income from IWT. They also provide a mechanism for occupying limited time and resources that might otherwise be allocated to IWT. In some cases, the ability to benefit from alternative livelihoods interventions is made conditional on wildlife conservation. In these cases, the interventions serve to increase the costs of engaging in IWT (thus falling within Box 4 in Fig 1). However, the evidence for the effectiveness of these approaches (in terms of delivering conservation outcomes) is scant (Roe et al. 2015b; Wicander and Coad 2014). In particular, it is unclear if the provision of benefits from alternative livelihoods interventions replaces or simply supplements IWT benefits (Wright et al 2015). There are some examples in which alternative livelihoods have been used as one component of a package of interventions to tackle IWT (Lotter and Clark 2014) or where "reformed poachers associations" have been established on the premise of provision of alternative sources of income-earning opportunities (see Harrison et al 2015). But, as with other non-conditional conservation incentives, we are sceptical about their wide-scale adoption in combating IWT.

What's wrong with current approaches?

The dominant approach to countering IWT based on "top down" enforcement (Fig 2(A)) has a number of serious limitations. While regulation and enforcement clearly have an important role to play in reducing IWT, an exclusive focus on this element of our framework has several potentially perverse collateral impacts: it ignores important ramifications for other costs and benefits that shape incentives for IWT; it overlooks the potential for reducing incentives for IWT through strategies that change other incentives; and it fails to leverage (and indeed may impair) more nuanced and locally engaged forms of monitoring and enforcement (e.g. community-led efforts).

Top down (and particularly militarised) enforcement strategies frequently not only change the costs of engaging in IWT, but can produce a range of other (sometimes unanticipated) impacts that can collectively undermine conservation incentives (see Fig 2(B)). Where enforcement efforts are upholding local rights, providing security and/or defending a community's assets they will strengthen community benefits from conservation and may well increase support for it. But poorly directed or heavy-handed efforts can impose unjustified restrictions on people's use of wildlife resources, infringe rights, and undermine the benefits that local people can gain from conservation and wildlife protection. Interventions justified by cracking down on IWT can, for example, curtail livelihood benefits from legitimate use of wildlife through subsistence use, trade, or trophy hunting programmes. Heavy-handed enforcement can further involve unjust

persecution, harassment and human rights abuses by authorities (Corry 2015), increasing the perceived costs of living alongside wildlife. When people lose benefits and feel increasing costs of conservation, this can lead to anger and resentment - traits associated with poaching in some studies (Twinamatsiko et al. 2014).

It is also plausible that enforcement-focused strategies (top-down or otherwise) can actually increase the individual benefits gained from IWT, when they reduce the supply of illegal products but demand remains constant or indeed increases with product rarity (Chen 2015). In these circumstances prices for illegal products are expected to continue to rise and may further incentivise IWT.

By contrast, approaches that explicitly seek to empower and engage communities in combating IWT can harness multiple levers to shift conservation incentives in a positive direction (Fig 2(C)), while safeguarding and promoting critical human rights and livelihood concerns (see e.g. IUCN SULi et al. 2015, pp 15-19). Community-led interventions can motivate community members to protect wildlife through simultaneously supporting their rights to benefit from wildlife resources and associated sense of ownership, seeking to increase the benefits they gain through doing so and minimising the costs, as well as fostering more efficient and powerful forms of enforcement through drawing on the energies and capacities of motivated community members as active partners in combating IWT. While enforcement plays a critical role in this model, it is enforcement that upholds and protects the rights of individual community members, rather than potentially undermining them. Integrating these approaches offers a far more coherent and, where successful, more powerful package of incentives raising far fewer social concerns than purely enforcement-focused interventions.

Where to from here?

Community-based approaches alone are unlikely to be adequate to stem IWT, particularly in the face of escalating commodity values for wildlife traded illegally, the militarisation of poaching, and the involvement of "outsiders", including sophisticated organised crime networks, in IWT (Duffy 2014). A critical need is for better understanding of where and how community-level approaches can effectively help combat IWT (Biggs et al. 2016). State-led and/or private law enforcement will rightly continue to play an essential role in successful natural resource management and in the battle against IWT (Phelps et al. 2014). However, a frequent, often narrow preoccupation with this approach may be compromising the possibilities for exploring fruitful and complementary pathways that engage and support communities – risking the undermining of anti-IWT efforts by alienating or disenfranchising local residents in source areas of illicit wildlife goods. Improving relations with communities and increasing incentives for conservation – in ways that effectively meet the requirements of Fig 1 – creates the necessary backbone for successful enforcement by providing a critically needed enabling environment. In addressing the current devastating state of IWT it is urgent and essential that interventions combine the best of both "top-down" enforcement and diverse

community-engagement approaches, while always carefully considering the various feedbacks and unintended consequences they can cause.

Acknowledgments:

We thank all participants in the “Beyond Enforcement” symposium convened by IUCN SULi, IIED, TRAFFIC, the Austrian Ministry of the environment and ARC Centre of Excellence for Environmental Decisions (CEED; University of Queensland) in South Africa, February 2015; supported by GIZ, the Austrian Ministry of the Environment and USAID; and the follow up workshop supported by CEED. Rosie Cooney was supported by a grant from the Environment Agency of Abu Dhabi, Dilys Roe by a grant from the UK Department for International Development. All authors contributed substantively to the development of the concepts and writing with the first author leading on both.

References:

- Biggs, D., Cooney, R., Roe, D., Dublin, H., Allan, J., Challender, D. and Skinner, D (2016) Developing a theory of change for a community-based response to illegal wildlife trade. *Cons. Biol.* doi: 10.1111/cobi.12796

- Blackburn, S., Hopcraft, G.C., Ogutu, J.O., Matthiopoulos, J., Frank, L. (2016). Human-wildlife conflict, benefit sharing and the survival of lions in pastoralist community-based conservancies. *J. Appl. Ecol.* doi: 10.1111/1365-2664.12632
- Buscher, B and M. Ramutsindela. (2016) Green Violence: Rhino Poaching and the war to save southern Africa's Peace Parks. *Afr. Affairs*, **115**(458): 1–22.
- Challender, D.W.S., MacMillan, D.C. (2014). Poaching is more than an Enforcement Problem. *Conserv. Lett.*, **7**(5), 484 - 494.
- Chen, F. (2015). Poachers and Snobs: Demand for Rarity and the Effects of Antipoaching Policies. *Conserv. Lett.*, **9**: 65-69.
- Child, B. (1995). The practice and principles of community-based wildlife management in Zimbabwe: the CAMPFIRE programme. *Biodiv. Conserv.*, **5**(3): 369–398.
- Corry, S. (2015). When Conservationists Militarise, Who's the Real Poacher? *Truthout*. Available from <http://www.truth-out.org/opinion/item/32255-when-conservationists-militarize-who-s-the-real-poacher>. Accessed 22 January 2016.
- Dickman, A.J. (2010). Complexities of conflict: the importance of considering social factors for effectively resolving human-wildlife conflict. *Anim. Conserv.*, **13**(5), 458 - 466.

- Duffy, R. (2010) *Nature Crime: How We're Getting Conservation Wrong*. Yale University Press, New Haven, CT and London.
- Duffy, R. (2014). Waging a war to save biodiversity: the rise of militarized conservation. *Int. Aff.*, **90**(4), 819 - 834.
- Duffy, R., Humphreys, J. (2014). Mapping donors: key areas for tackling illegal wildlife trade (Asia and Africa). Evidence on Demand, UK. Available from <http://www.evidenceondemand.info/mapping-donors-key-areas-for-tackling-illegal-wildlife-trade-asia-and-africa>. Accessed 22 January 2016.
- Ferreira, S., Hofmeyr, M., Pienaar, D., Cooper D. (2014). Chemical horn infusions: a poaching deterrent or unnecessary deception? *Pachyderm*, **55**: 54.
- Gibson, C. C., & Marks, S. A. (1995). Transforming rural hunters into conservationists: an assessment of community-based wildlife management programs in Africa. *World Development*, **23**(6), 941-957.
- Harrison M., Roe, D., Baker, J., Mwedde, G., Travers, H., Plumptre, A., Rwetsiba, A., and Milner-Gulland, E.J. (2015) *Wildlife crime: a review of the evidence on drivers and impacts in Uganda*. IIED Research Report, London. Available at <http://pubs.iied.org/17576IIED> Accessed 1 May, 2016.

Hawdon, J., Ryan, J. (2011). Neighborhood Organizations and Resident Assistance to Police. *Soc. Forum*, **26**(4), 897 - 920.

Hoare, R. (2012). Lessons from 15 years of human-elephant conflict mitigation: Management considerations involving biological, physical and governance issues in Africa. *Pachyderm.*, **51**, 60 - 74.

Hulme, D., Murphree, M., (2001). *African Wildlife and Livelihoods: the Promise and Performance of Community Conservation*. James Curry, Oxford, UK.

IUCN SULi. (2015). Beyond Enforcement: communities, governance incentives and sustainable use in combating wildlife crime. Symposium Report. IIED, London, UK. Available from <http://pubs.iied.org/G03903.html>. Accessed 22 January 2016.

Konopo, J. (2016) Botswana's 'shoot-to-kill policy' against suspected poachers. Mail and Guardian, 18 March 2016. Available from <http://mg.co.za/article/2016-03-16-botswanas-shoot-to-kill-policy-against-suspected-poachers>. Accessed May 6 2016.

Lewis, D., Bell, S.D., Fay, J., Bothi, K.L., Gatere, L., Kanila, M., Mukamba, M., Matokwani, E., Mushimbalume, M., Moraru, C.I., Lehmann, J., Lassoie, J., Wolfe, D., Lee, D. R., Buck, L., Travis, A.J. (2011). Community Markets for Conservation (COMACO)

links biodiversity conservation with sustainable improvements in livelihoods and food production. *P. Nat. A. Sci.* **108**(34), 13957-13962.

Linkie, M., Martyr, D.J., Harihar, A., Risdianto, D., Nugruha, R.T., Maryati., Leader-

Williams, N., Wong, W.M. (2015). Safeguarding Sumatran tigers: evaluating effectiveness of law enforcement patrols and local informant networks. *J. Appl. Ecol.* **52**(4), 851 - 860.

Lotter, W., Clark, K. (2014). Community involvement and joint operations aid effective anti poaching in tanzania. *PARKS.* **20**(1), 19 – 28.

Lunstrum, E. (2014). Green Militarization: Anti-Poaching Efforts and the Spatial Contours of Kruger National Park. *Ann. Assoc. Am. Geogr.* **104**(4), 816 - 832.

Makoye, K (2014). Anti-poaching operation spreads terror in Tanzania. Inter Press Service. Jan 6th, 2014. Available at <http://www.ipsnews.net/2014/01/anti-poaching-operation-spread-terror-tanzania/> Accessed May 1, 2016.

Milner-Gulland, E.J., Rowcliffe, J.M. (2007). *Conservation and Sustainable Use: A Handbook of Technique*. Oxford University Press, Oxford, UK.

Naidoo, R., Weaver, C.L., Diggle, R.W., Matongo, G., Stuart-Hill, G., Thouless, C. (2016). Complementary benefits of tourism and hunting to communal conservancies in Namibia. *Cons. Biol.* **30**(3): 628-638. doi: 10.1111/cobi.12643.

- Ostrom, E. (1990). *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge University Press, Cambridge, UK.
- Phelps, J., Shepherd, C.R., Reeve, R., Niissalo, M.A., Webb, E.L. (2014). No Easy Alternatives to Conservation Enforcement: Response to Challenger and Macmillan. *Conserv. Lett.* 7(5), 495 - 496.
- Phelps, J., and Webb, E.L. (2015) “Invisible” wildlife trades: Southeast Asia’s undocumented illegal trade in wild ornamental plants. *Biol. Conserv.* 186: 296–305.
- Roe, D., (2015). *Conservation, crime and communities: case studies of efforts to engage local communities in tackling illegal wildlife trade*. IIED, London, UK. Available at <http://pubs.iied.org/14648IIED.html>. Accessed 22 January 2016.
- Roe, D., Cooney, R., Dublin, H., Challender, D.W.S., Biggs, D., Skinner, D., Abensberg-Traun, M., Ahlers, N., Melisch, R., Murphree, M. (2015a). Beyond enforcement: engaging communities in tackling wildlife crime. *IIED Briefing Paper*. IIED, London, UK. Available at <http://pubs.iied.org/17293IIED.html>. Accessed 22 January 2016.
- Roe, D., Day, M., Booker, F. Zhou, W. Allebone-Webb, S., Kumpel, N., Hill, N.A.O., Wright, J., Rust, N., Sunderland, T.C.H., Redford, K., Petrokofsky, G. (2015b). Are alternative livelihood projects effective at reducing local threats to specified elements

of biodiversity and/or improving or maintaining the conservation status of those elements? A systematic review. *Environ. Evid.* **4**: 22

St John, F.A.V., Mai, C. H., Pei, K.J.C. (2015). Evaluating deterrents of illegal behaviour in conservation: carnivore killing in rural Taiwan. *Biol. Conserv.*, **189**: 86 - 94.

Twinamatsiko, M., Baker, J., Harrison, M., Shirkhoshidi, M., Bitariho, R. Wieland, M., Asuma, S., Milner-Gulland, E.J., Franks, P., Roe, D. (2014). Linking Conservation, Equity and Poverty Alleviation: Understanding profiles and motivations of resource users and local perceptions of governance at Bwindi Impenetrable National Park, Uganda. *IIED Research Report*. IIED, London, UK. Available at <http://pubs.iied.org/14630IIED>. Accessed 22 January 2016.

Wicander, S., Coad, L. (2014). *Learning our Lessons: a Review of Alternative Livelihood Projects in Central Africa*. Environmental Change Institute, University of Oxford, UK, & IUCN, Gland, Switzerland. Available at http://cmsdata.iucn.org/downloads/english_version.pdf Accessed 13 May 2016.

Wilkie, D., Painter, M., and Jacob, I. (2016) Rewards and Risks Associated With Community Engagement in Anti-Poaching and Anti-Trafficking. Biodiversity Technical Brief. United States Agency for International Development, Washington. Available at http://pdf.usaid.gov/pdf_docs/PA00M3R9.pdf Accessed 20 July 2016.

This article is protected by copyright. All rights reserved.

- Wittemyer, G., Northrup, J.M., Blanc, J., Douglas-Hamilton, I., Omondi, P., and Burnham, K.P. (2014). Illegal killing for ivory drives global decline in African elephants. *Proc. Nat. Acad. Sci.* **111**(36): 13117-13121.
- Wright, J.H., Hill, N.A., Roe, D., Rowcliffe, J.M., Kumpel, N.F., Day, M., Booker, F. and Milner-Gulland, E.J. (2016). Reframing the concept of alternative livelihoods. *Conserv. Biol.* **30**(1): 7-13. doi:10.1111/cobi.12607

Fig1

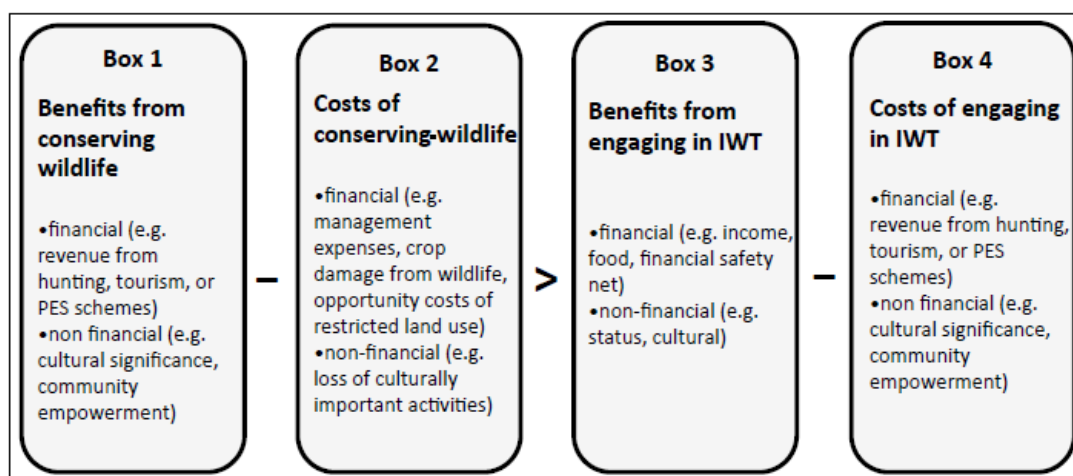
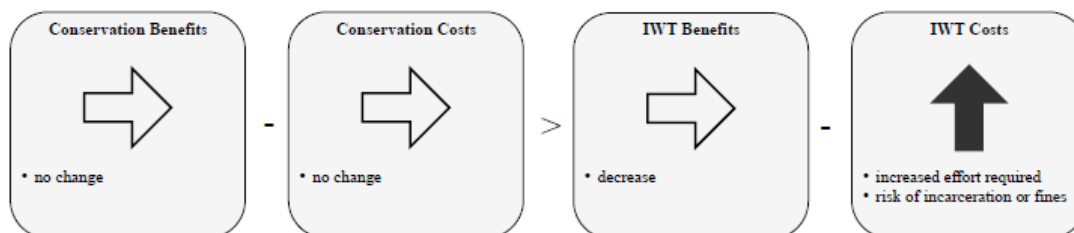
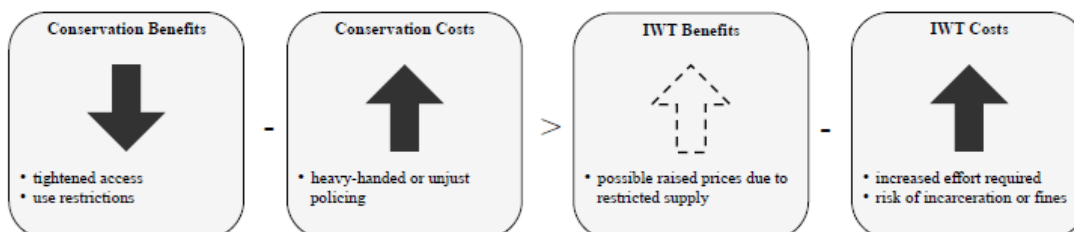


Fig2

A: How enforcement interventions seek to change incentives to conserve and engage in IWT



B: How enforcement interventions may inadvertently change incentives to conserve and engage in IWT



C: How approaches that empower and engage communities may change incentives to conserve and engage in IWT

